



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
-----------------	-------------	----------------------	---------------------	------------------

10/063,357

04/15/2002

Yu Wang

RD-27969

2724

22428

7590

07/27/2004

FOLEY AND LARDNER

SUITE 500

3000 K STREET NW

WASHINGTON, DC 20007

EXAMINER

HO, ALLEN C

ART UNIT

PAPER NUMBER

2882

DATE MAILED: 07/27/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

7

Office Action Summary	Application No. 10/063,357	Applicant(s) WANG ET AL.	
	Examiner Allen C. Ho	Art Unit 2882	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 15 April 2002.
- 2a) ☐ This action is FINAL.
- 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-36 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-6, 12-15, 22-30 and 34-36 is/are rejected.
- 7) ☒ Claim(s) 7-11, 16-21 and 31-33 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 06 August 2002 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 a) ☐ All b) ☐ Some * c) ☐ None of:
 1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
 Paper No(s)/Mail Date 052002.
- 4) ☐ Interview Summary (PTO-413)
 Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION***Drawings***

1. Fig. 2 is objected to as failing to comply with 37 CFR 1.84(p)(4) because reference character "5" has been used to designate both arc-shaped track and shaft. Corrected drawing sheets are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Specification

2. The disclosure is objected to because of the following informalities:

- (1) Paragraph [0020], lines 7-8, "application serial number 10/ , (attorney docket number 040849/0186)," should be replaced by --No. 6,707,878--.
- (2) Paragraph [0027], line 4, "first" should be replaced by --second--.
- (3) Paragraph [0027], line 7, "may" before "27" should be deleted.
- (4) Paragraph [0040], line 2, "13" should be replaced by --47--.
- (5) Paragraph [0041], line 2, "second" should be replaced by --first--.

Appropriate correction is required.

Claim Objections

3. Claims 1-21 are objected to because of the following informalities:

(1) These claims use the phrase "adapted to". Language, such as "adapted to", that suggests or makes optional but does not require steps to be performed or does not limit a claim to a particular structure does not limit the scope of a claim or claim limitation. MPEP § 2106. The applicants are advised to amend the claims so that the limitations are positively recited.

(2) Claim 25 should depend on claim 24. Claim 25 recites the limitation "the fifth means". There is insufficient antecedent basis for this limitation in the claim.

Appropriate correction is required.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

5. Claims 1-3, 5, 12, 13, and 22-30 are rejected under 35 U.S.C. 102(e) as being anticipated by Lin *et al.* (U. S. Patent No. 6,236,708 B1).

With respect to claim 1, Lin *et al.* disclosed an imaging system, comprising: an x-ray source (14) moving in an arc-shaped path; a stationary electronic x-ray detector (18); a track

Art Unit: 2882

(16); and a mechanical driving mechanism (44) for moving the x-ray source in the arc-shaped path.

With respect to claim 2, Lin *et al.* disclosed the system of claim 1, further comprising a processor (28) that forms a three-dimensional image.

With respect to claim 3, Lin *et al.* disclosed the system of claim 2, wherein the electronic x-ray detector is mounted to a second support, such that an imaging volume is formed above the detector (Figs. 6-8).

With respect to claim 5, Lin *et al.* disclosed the system of claim 1, wherein: the system is a tomosynthesis mammography system (the system can imaging the breast); the system is positioned substantially vertical relative to the ground; and the mechanical driving mechanism moves the x-ray source in a stepped motion in the arc-shaped path.

With respect to claim 12, Lin *et al.* disclosed a tomosynthesis x-ray mammography imaging system, comprising: an x-ray source (14) moving an arc-shaped path; an arc-shaped track (16) provided to allow the x-ray source to move in the arc-shaped path; a stationary electronic x-ray detector (18) positioned opposite the x-ray source; and a mechanical driving mechanism (44) for moving the x-ray source in the arc-shaped path.

With respect to claim 13, Lin *et al.* disclosed the system of claim 12, further comprising a processor (28) that forms a three-dimensional image.

With respect to claim 22, Lin *et al.* disclosed a tomosynthesis x-ray mammography imaging system, comprising: a first means (14) for irradiating a patient's breast with an x-ray dose at a plurality of steps along an arc-shaped path; a second means (44) for mechanically moving the first means in a stepped motion on the arc-shaped path around the patient's breast; a

Art Unit: 2882

third means (18) for detecting the x-rays transmitted through the patient's breast; and a fourth means (28) for constructing a three-dimensional image of the patient's breast from a signal output by the third means.

With respect to claim 23, Lin *et al.* disclosed the system of claim 22, wherein the system is positioned substantially vertical relative to the ground.

With respect to claim 24, Lin *et al.* disclosed the system of claim 22, further comprising a fifth means (16) for providing the arc-shaped path for the first means.

With respect to claim 25, Lin *et al.* disclosed the system of claim 24, further comprising a sixth means (28) for connecting the first means to the second means, and for moving the first means along the fifth means.

With respect to claim 26, Lin *et al.* disclosed the system of claim 22, further comprising: a seventh means (52) for connecting the first means to the second means (motors, column 8, lines 59-62); and an eighth means (50) for providing an arc-shaped path for movement of the seventh means (column 7, lines 1-10).

With respect to claim 27, Lin *et al.* disclosed the system of claim 22, further comprising: a seventh means (50) for connecting the first means to the second means (motors for rotating 50, column 8, lines 59-62); an eighth means (52) for providing a linear motion path for the seventh means; a ninth means (12) for supporting the third means; a tenth means (motor for translating 52) for allowing relative motion between the eighth means and the ninth means to allow the first means to move in the arc-shaped path while the seventh means move along the linear motion path (column 7, lines 1-10).

Art Unit: 2882

With respect to claim 28, Lin *et al.* disclosed the system of claim 22, further comprising a ninth means (Fig. 1) for supporting the third means.

With respect to claim 29, Lin *et al.* disclosed a tomosynthesis x-ray imaging method, comprising: mechanically moving (44) an x-ray source (14) in a stepped motion on an arc-shaped path around an object using a track (16); irradiating (14) the object with an x-ray dose from the x-ray source located at a plurality of steps along the arc-shaped path; detecting (14) the x-ray transmitted through the object with a stationary electronic x-ray detector; and constructing (28) a three-dimensional image of the object from a signal output by the electronic detector.

With respect to claim 30, Lin *et al.* disclosed the method of claim 29, wherein the step of mechanically moving an x-ray source comprising moving the x-ray source on an arc-shaped track (16).

6. Claims 22-24 and 28 are rejected under 35 U.S.C. 102(b) as being anticipated by Niklason *et al.* (U. S. Patent No. 5,872,828).

With respect to claim 22, Niklason *et al.* disclosed a tomosynthesis x-ray mammography imaging system, comprising: a first means (12, 73) for irradiating a patient's breast with an x-ray dose at a plurality of steps along an arc-shaped path; a second means (30) for mechanically moving the first means in a stepped motion on the arc-shaped path around the patient's breast; a third means (14, 72) for detecting the x-rays transmitted through the patient's breast; and a fourth means (10) for constructing a three-dimensional image (column 8, lines 29-37) of the patient's breast from a signal output by the third means.

With respect to claim 23, Niklason *et al.* disclosed the system of claim 22, wherein the system is positioned substantially vertical relative to ground.

Art Unit: 2882

With respect to claim 24, Niklason *et al.* disclosed the system of claim 22, further comprising a fifth means (75) for providing the arc-shaped path for the first means.

With respect to claim 28, Niklason *et al.* disclosed the system of claim 22, further comprising a ninth means (71) for supporting the third means.

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. Claims 4 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lin *et al.* (U. S. Patent No. 6,236,708 B1) as applied to claims 3 and 13 above, and further in view of Ivan *et al.* (U. S. Patent No. 5,877,501).

With respect to claims 4 and 14, Lin *et al.* disclosed the system of claims 3 and 13. However, Lin *et al.* failed to teach that the electronic x-ray detector comprises an x-ray sensitive scintillator and a solid state radiation detector.

Ivan *et al.* disclosed an x-ray detector comprising an x-ray sensitive scintillator (16) and a solid state radiation detector (10).

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to employ an x-ray detector that comprises an x-ray sensitive scintillator and a solid state radiation detector, since this type of x-ray detector is the most commonly used detector for x-ray detection.

Art Unit: 2882

9. Claims 6 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lin *et al.* (U. S. Patent No. 6,236,708 B1) as applied to claims 1 and 12 above.

With respect to claims 6 and 15, Lin *et al.* disclosed the system of claims 1 and 12, wherein the mechanical driving mechanism comprises a motor (44). However, Lin *et al.* failed to teach that the motor is attached to the x-ray source.

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to attach the motor to the x-ray source, since a person would be motivated to attach the motor to either the x-ray source or the track to move the x-ray source relative to the track; it is simply a design choice.

10. Claims 34-36 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lin *et al.* (U. S. Patent No. 6,236,708 B1) as applied to claim 29 above.

With respect to claim 34, Lin *et al.* disclosed the method of claim 29. However, Lin *et al.* failed to teach that the patient is standing adjacent to the machine, and the patient's breast is located on the electronic x-ray detector.

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify the patient support disclosed by Lin *et al.* for a mammography, since a person would be motivated to apply the same imaging principle to different objects and/or situations.

With respect to claims 35 and 36, Lin *et al.* disclosed the method of claim 34. However, Lin *et al.* failed to teach the sampling parameters set forth in claims 35 and 36.

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to use the sampling parameters set forth in claims 35 and 36, since a person

Art Unit: 2882

would be motivated to choose sampling parameters to obtain images suitable three-dimensional reconstruction.

Double Patenting

11. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and, *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

12. Claims 1 and 12 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 4, 5, 12, and 13 of U.S. Patent No. 10/063,354. Although the conflicting claims are not identical, they are not patentably distinct from each other.

Claims 4, 5, 12, and 13 of U.S. Patent No. 10/063,354 claim an imaging system comprising: an x-ray source adapted to move in an arc-shaped path; an arc-shaped track provided to allow the x-ray source to move in the arc-shaped path; a stationary electronic x-ray detector; and a mechanical driving mechanism which is adapted to move the x-ray source in the arc-shaped path.

Allowable Subject Matter

13. Claims 7-11, 16, 17, and 31-33 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

14. Claims 18-21 are allowed over the prior art.

15. The following is a statement of reasons for the indication of allowable subject matter:

With respect to claim 7, the prior art fails to teach or fairly suggest the system of claim 1, wherein mechanical driving mechanism comprises a first arm, having a first portion connected to the x-ray source and a second portion connected to a motor which provides torque to the second portion of the first arm to move the x-ray source along the arc-shaped track as claimed.

With respect to claims 8 and 9, the prior art fails to teach or fairly suggest the system of claim 1, wherein the x-ray source is mounted to a first portion of a first arm, a second portion of the first arm distal from the first portion is mounted to the arc-shaped track, and the mechanical driving mechanism comprises a motor which moves the second portion of the first arm along the arc-shaped track to move the x-ray source in the arc-shaped path as claimed.

With respect to claims 10 and 11, the prior art fails to teach or fairly suggest the system of claim 1, wherein the track comprises a linear motion track, the x-ray source is mounted to a first portion of a first arm, a second portion of the first arm distal from the first portion is mounted to the linear motion track, and the mechanical driving mechanism comprises a ball screw which moves the second portion of the first arm along the linear motion track to move the x-ray source in the arch-shaped path as claimed.

With respect to claim 16, the prior art fails to teach or fairly suggest the system of claim 12, wherein the x-ray source is mounted to the arc-shaped track and connected to a first portion of a first arm, the second portion of the first arm distal from the first portion is connected to the mechanical driving mechanism, and the mechanical driving mechanism comprises a motor which rotates the second portion of the first arm to move the x-ray source along the arc-shaped track as claimed.

With respect to claim 17, the prior art fails to teach or fairly suggest the system of claim 12, wherein the x-ray source is mounted to a first portion of a first arm, a second portion of the first arm distal from the first portion is mounted to the arc-shaped track, and the mechanical driving mechanism comprises a motor which moves the second portion of the first arm along the arc-shaped track to move the x-ray source in the arc-shaped path as claimed.

With respect to claims 18-21, the prior art fails to teach or fairly suggest a tomosynthesis x-ray mammography imaging system comprising an x-ray source mounted onto an upper portion of a first arm, a stationary electronic x-ray detector mounted facing the x-ray source to a first side of the second arm, a shaft rotatably connecting a middle portion of the first arm to a middle portion of the second arm, a linear motion track that moves relative to the second arm, and a mechanical driving mechanism which moves a lower portion of the first arm along the linear motion track such that the x-ray source moves in an arc-shaped path as claimed.

With respect to claim 31, the prior art fails to teach or fairly suggest the method of claim 30, wherein the x-ray source is moved on the arc-shaped track by a first arm being rotated by a motor as claimed.

With respect to claim 32, the prior art fails to teach or fairly suggest the method of claim 29, wherein the step of mechanically moving the x-ray source comprises moving a first portion of a first arm on an arc-shaped track while a second portion of the first arm supports the x-ray source as claimed.

With respect to claim 33, the prior art fails to teach or fairly suggest the method of claim 29, wherein the step of mechanically moving an x-ray source comprises moving a first arm supporting the x-ray source on a linear motion track while allowing relative motion between the track and a second arm supporting the electronic x-ray detector as claimed.

Conclusion

16. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure:

- (1) Eberhard *et al.* (U. S. Patent No. 6,751,285 B2) disclosed a dose management system for mammographic tomosynthesis.
- (2) Eberhard *et al.* (U. S. Patent No. 6,647,092 B2) disclosed a radiation imaging system and method of collimation.
- (3) Eberhard *et al.* (U. S. Pub. No. 2003/0194050 A1) disclosed a multi modality x-ray mammography imaging system.
- (4) Wilson *et al.* (U. S. Patent No. 6,496,557 B2) disclosed a two-dimensional slot x-ray bone densitometry, radiography, and tomography.
- (5) Hewes *et al.* (U. S. Patent No. 6,375,352 B1) disclosed an apparatus and method for obtaining x-ray tomosynthesis data for mammography.


- (6) Lin *et al.* (U. S. Patent No. 6,222,902 B1) disclosed a real-time tomographic system with flat panel detectors.
- (7) Heidsieck *et al.* (U. S. Patent No. 5,539,797) disclosed method and apparatus for digital stereotaxic mammography.
- (8) Siczek (U. S. Patent No. 5,386,447) disclosed mammographic screening and biopsy apparatus.
- (9) Schwierz (U. S. Patent No. 5,029,192) disclosed a CT comprising an arc-shaped track for x-ray source.
- (10) Romeas *et al.* (U. S. Patent No. 5,018,176) disclosed a mammography apparatus.
- (11) Siczek *et al.* (U. S. Patent No. 4,979,202) disclosed a support structure for x-ray imaging apparatus comprising an arc-shaped track.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Allen C. Ho whose telephone number is (571) 272-2491. The examiner can normally be reached on Monday - Friday from 8:00 am - 5:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Edward J. Glick can be reached at (571) 272-2490. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Art Unit: 2882

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Allen C. Ho
Patent Examiner
Art Unit 2882